

Amendments to the Specification:

Please replace paragraph [0002] with the following amended paragraph:

[0002] In hydraulic brake boosters of a type disclosed in U.S. Patent 4,281,585; 4,539,892; 4,625,515; 6,561,596 and ~~U.S. Application No. 10/307,791~~ filed December 02, 2002 6,732,578, a control valve is located in a first bore and a power piston is located in a second bore of a housing. A lever arrangement is connected to the power piston and the control valve. An input force applied to a brake pedal by an operator acts on the lever arrangement to develop a manual mode and a power assist mode of operation. The lever arrangement pivots on the power piston and communicates an actuation force that moves the control valve to regulate the flow of pressurize fluid from a source to an operational chamber. The regulated pressurized fluid supplied to the operational chamber acts on the power piston in the first bore to develop an operational force that pressurizes fluid that is supplied to wheel brakes to effect a corresponding brake application. A reaction force produced by regulated pressurized fluid in the movement of the power piston is transmitted back to the brake pedal to balance the input force such that the operational force supplied to move the power piston in the first bore is a function of the input force applied to the brake pedal.

Please replace paragraph [0003] with the following amended paragraph:

[0003] Additional features such as traction control, dynamic operational control and anti-skid control under the control of an ECU have been added to hydraulic brake booster to provide a total brake system. During an ECU generated brake application, the brake pedal of the hydraulic booster may

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mirror the movement of the power piston. In addition, as a result of the rapid opening and closing of the control valve during a ECU generated brake application, an increase in the level of noise created as pressurized fluid flows to the actuation chamber and on released from the brake chamber may occur. Structure to hold a brake pedal stationary during an ECU generated brake application is disclosed in U.S. Patent 6,203,119 wherein a control valve seat moves to meter pressurize fluid; in U.S. Patent Application No. ~~10/307,791~~ 6,732,518 where a separate piston is provided to act on the control valve to meter pressurized fluid; and in U.S. Application 10/767,300 wherein a sleeve acts on the control valve to meter pressurized fluid to effect a brake application but it would not appear that the creation of noise has been specifically addressed in the known prior art.

Please replace paragraph [0005] with the following amended paragraph:

[0005] According to this invention, the brake booster has a housing with a first bore therein for retaining a power piston, a second bore therein for retaining the control valve and an actuation chamber. The control valve sequentially connects a source of pressurized fluid to the actuation chamber and a reservoir in response to an input force from an actuation arrangement. The pressurized fluid available from the source presented to the actuation chamber acts on the power piston to effect a brake application. On termination of the input force the shuttle valve controls communication of the pressurized fluid present in the actuation chamber to the reservoir. The control valve is characterized by a first cylindrical body that is located in the second bore and having a first stepped axial bore that extends from a first end to a second end. The first stepped bore has a first diameter section adjacent the first end that is separated from a second diameter section by an orifice and a shoulder that separates the second diameter section from a third diameter section that extends from the second end. The first diameter section is

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connected to the source of pressurized fluid while a first radial bore in the first cylindrical body connects the second diameter section with the actuation chamber and a second radial bore in the first cylindrical body connects the third diameter with the reservoir. A ball located in the first diameter section of the first cylindrical body is urged by a first spring toward a seat adjacent the orifice to define a supply chamber for pressurized fluid within the second bore. A shuttle member that is retained in the second diameter section of the first cylindrical body has a stem on a first end that is located near the orifice and an annular projection on a second end that extends into the third diameter section of the first cylindrical body. A seal carried by the shuttle member prevents fluid communication between the second diameter and second diameter section of the first cylindrical body. ~~A power~~ An actuation piston that is retained in a bearing-spacer has an annular flange on a first end that is located in the third diameter section of the first cylindrical body and a second end that extends into the actuation chamber. The ~~power~~ actuation piston has a second stepped axial bore that extends from the first end to the second end such that the third diameter section of the first cylindrical body is connected to the actuation chamber. A second spring that is located in the first stepped axial bore urges the second end of the shuttle member toward a first stop within the second bore to define a position of rest for the shuttle member. A third spring that is located between the second end of the shuttle member and the first end of the ~~power~~ actuation piston urges the annular flange toward a second stop to define a position of rest for the ~~power~~ actuation piston. With the shuttle member and ~~power~~ actuation piston in rest positions, the actuation chamber may freely communicate with the reservoir by way of the second stepped axial bore, third diameter section and second radial bore in the first cylindrical body. An input force applied by actuation arrangement acts on the second end of the ~~power~~ actuation piston and after overcoming the force the third spring moves the annular flange into engagement with the annular projection on the shuttle member to terminate communication to the reservoir through the second axial

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bore and thereafter ~~overcoming~~ overcomes the force of the second spring ~~moves to move~~ the stem into engagement with the ball and finally after overcoming the force of the first spring moves the ball off the seat to allow metered pressurized fluid to flow through the orifice and be communicated to the actuation chamber by way of the second diameter and first radial bore to effect a brake application. On the said input force being removed from the second end of the ~~second cylindrical member~~ actuation piston, the first spring moves the ball into engagement with the seat to ~~termination~~ terminate communication of pressurized fluid through the orifice while the third spring moves the flange away from the annular projection on the shuttle member to meter the flow of pressurized fluid present in the actuation chamber to the reservoir by way of the second stepped axial bore in the ~~second cylindrical member~~ actuation piston, the third diameter and second radial bore in the first cylindrical member. Since the shuttle member is sealed in the second diameter section of the first cylindrical body, the flow of fluid between the orifice and the second radial bore only occurs along a flow path defined by the first radial bore, actuation chamber and second stepped axial bore and as a result of the shape of the stem and annular projection the oscillation of the shuttle member is does not oscillate within the second diameter to create noise during the operation of the brake booster.

Please replace paragraph [0023] with the following amended paragraph:

[0023] The details of hydraulic brake booster 12 is best illustrated in Figures 2-11 and with the exception of control valve 60 is similar to the structure disclosed in U. S. Patent Application ~~10/307,791~~ 6,732,518. The brake booster includes a housing 100 with a power piston 50 that is sealingly retained in a first bore 102 and a control valve 60 that is sealingly retained in a second bore 104, an input member 30 piloted in power piston 50 and linked to the control valve 60 by the lever arrangement 200. In the boost or first mode,

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the lever arrangement 200 is responsive to a braking input force that is communicated from a brake pedal 28 to the input member 30 for moving the control valve 60 that meters pressurized fluid from a source, either pump 24 or accumulator 22. The metered pressurized fluid is communicated to a actuation chamber 80 in housing 100 and acts on the power piston 50 to develop a hydraulic actuation force that in turn acts on a piston in the master cylinder 13 to pressurize fluid therein that is communicated to the wheel brakes wheel brakes 14, 14' and 18,18' in a brake system 10 for effecting a corresponding brake application.

Please replace paragraph [0026] with the following amended paragraph:

[0026] The control valve 60 further includes a shuttle member 66, see Figures 3,4 and 5 that is sealingly retained in the second diameter 65b of bore 65 of the first cylindrical body 62. Shuttle member 66 has an integral axial stem 68 on a first end 81a that functions as a needle valve within the stepped bore 65 of the first cylindrical body 62 and an annular projection 72 located on a second end 81b that extends into the third diameter area 65c of the first cylindrical body 62. The shuttle member 66 is a solid cylindrical member that includes a rib 70 that is located between the first end 81a and the second end 81b and a seal 70a that is carried by the cylindrical body 66. The seal 70a engages the second diameter 65b and prevents the direct communication of fluid that flow flows through the orifice 54 ~~from flowing~~ to the third diameter 65c area of the cylindrical body 62. The annular projection 72 is defined by a conical entry surface 72a that transitions into a cylinder surface 72b adjacent a bearing and sealing surface 72c.

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Please replace paragraph [0028] with the following amended paragraph:

[0028] The second cylindrical body 64, see Figures 3 and 5, is sealingly located in the second bore 104 with a first end 84 located in the third diameter 65c of the first cylindrical body 62 and a second end 85 that extends into the actuation chamber 80. The first end 84 extends into the second bore 104 a distance established by the engagement of shoulder 84a with shoulder 101 to set the alignment of radial bores or passages 58, 58'...58" with ports 106 and 110 and radial bore passage 74 with port 112. The stepped bore 67 has a first diameter 67a and a second diameter 67b such that an actuation sleeve 89 is concentrically located in the first diameter 67a ~~has~~ with an inner diameter 89a that is matched with the second diameter 67b to define a uniform diameter for receiving an actuation piston 92. The sleeve 89 has a flange 90 that engages a shoulder 64a on the second cylindrical body 64 such that an end 90a is located in the a secondary actuation chamber 80' formed therein.

Please replace paragraph [0029] with the following amended paragraph:

[0029] A spacer 91, ~~defined by~~ in the form of a sleeve is located in the third diameter 65c of the first cylindrical body 62 between rib 70 on shuttle member 66 and the end 84 of the second cylindrical body 64 that is located in the second bore 104 to define a stop for shuttle member 66 within the first cylindrical body 62.

Please replace paragraph [0035] with the following amended paragraph:

[0035] The input member 30 as described in U.S. Patent Application ~~10/307,791~~ 6,732,518 includes; a cylindrical body 300 that is sealingly located in the first bore 102; a shaft 302 that is connected to push rod 29 by way of the cylindrical body 300 that is located in bore 306 within the power piston 50;

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a first spring 304 that is concentric to the shaft 302; a bracket 32 that is carried on shaft 302; a second or return spring 306 that acts on shaft 302 to urges the cylindrical body 300 toward a position of rest; and a ball valve assembly 308.

Please replace paragraph [0041] with the following amended paragraph:

[0041] In more detail, when an operator desires to effect a brake application in a vehicle having a hydraulic brake booster 12 as shown in Figure 2, an input force applied to brake pedal 28 that is communicated through input push rod 29 to move input member 30 that includes the cylindrical body 300, head 310 on stem 302 and bracket 32 all of which move in a direction toward power piston 50. Movement of the bracket 32 causes that end 208 of lever 202 to pivot about pin 206 and impart an actuation force through pin 228 at fulcrum 230. The actuation force at pin 228 is applied through the arms of the second lever 222 such that half of the actuation force is applied to end or face 61 on actuation piston 92 by way of cam surface 232 and the other half is applied to the end face 51 of the power piston 50 through the second end of the second lever 222. The actuation force applied to actuation piston 92 after overcoming return spring 77 moves flange 94 toward the conical surface 72a and into engagement with cylindrical surface 72b to terminate communication between axial bore 96 and the reservoir 108 as illustrated in Figures 9 and 10 and with further movement flange 94 engages bearing surface 72c and after overcoming the force of return spring 76 moves the shuttle member 66 such that end 81 on stem 68 engages ball 52 and after overcoming the force of spring 56 moves ball 52 away from seat 55 as illustrated in Figures 6,7 and 8 such that pressurized fluid flows from chamber 54a through orifice 54 into the operational chamber 85 within the second diameter area 65b of the first cylindrical body 64 and out radial bore 58' to actuation chamber 80 by way of passage 83. The metered pressurized supply fluid presented to chamber 80 acts on the second

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end 51 of piston 50 to create an operational force that is communicated through output push rod 11 to act on pistons in the master cylinder 13 and correspondingly pressurize fluid therein that is supplied through conduits 16 and 20 to effect a brake application in wheel brakes 14,14' and 18,18'. The flow of the pressurized fluid through the orifice 54 is defined by a space relationship between the cylindrical surface on stem and the conical surface on stem 68 such that metered pressurized fluid flow through the orifice 54 increases as a linear function of the movement of shuttle member 66 in response to an input force applied to the actuation piston 92. Depending on the application, this linear function could be modified by changing the length of the cylindrical surface 68a and/or the pitch of the conical surface 68b.

[0041.1] On termination of the input force to brake pedal 28, the component are returned to a position of rest as shown in Figures 2 and 3 such that actuation chamber 80 is in free communication with reservoir 108.

[0041.2] In returning the control valve 60 to the position of rest, the input force on end 61 of the actuation piston 92 is removed and spring 56 acts to move ball 52 against seat 55 to terminate the flow of pressurized fluid through orifice 54. With ball 52 on seat 55, the fluid pressure differential across shuttle member 66 is now essentially equal and as a result return spring 77 moves flange 94 into engagement with a stop defined by flange 90 on sleeve 89 and shoulder 64a to open communication between flange 94 and the annular projection 72 on the second end 81b of the shuttle member 66. The fluid pressure in the actuation chamber 80 is reduced by flow of fluid to reservoir 108 causing the pressure differential across the shuttle member 66 to be correspondingly reduced such that return spring 76 may now move rib 70 toward and into engagement with a stop defined by spacer ~~87~~ 91 and the first end of the second cylindrical member 64 as illustrated in Figure 3 and 5 such that chamber 80 is in free communication with reservoir 108. The flow of fluid

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from actuation chamber 80 is under the control of the end 81b of the shuttle member 66 and is metered by the space relationship between the conical surface 72a on the annular projection 72 and as a result flow occurs in a manner such that oscillation of the shuttle member 66 is essentially non-existent and any noise resulting from the flow of fluid to the reservoir 108 is minimal and does not add to the operational noise of the hydraulic brake system.

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